day, the distance of the moon from the sun and the stars. La Caille regretted that his other occupations would not permit him to compile this nautical Ephemerides himself. At a later time, in his treatise on navigation, he reverted to the same subject, and gave anew the sketch of his almanac, limiting himself to giving the distances every four hours for the meridian. His design was not followed. Lalande contented himself with analysing and discussing La Caille's method in the *Connaissance des Temps* for 1760. As to the French Marine, it was content to use "L'état du Ciel, calculé par Pingré et rapporté à l'usage des marins, 1754, 1755, 1756, et 1758." It was very different, however, in England.

(*To be continued.*)

SOUTH AFRICAN MUSEUM

THE *Cape Argus* for July 10 contains the report of the curator, Mr. Roland Trimen, of the South African Museum, for the previous half year. Many valuable additions have been made to the museum during that time, but its efficiency is very seriously crippled through want of funds, mainly due, we are sorry to say, to the parsimony of Government. We regret to see that the number of subscribers has seriously diminished from what it originally was, but the success of so valuable an institution should in no way be dependent on the capricious revenue to be derived from such a source. Let us hope that recent changes in the *personnel* of the Government will lead to greater liberality for this and for other scientific purposes. We cannot do better than give a few extracts from an excellent leader in the *Argus* on the Curator's report.

"Now that strong efforts are being made to forward the interests of education in the Colony, those institutions that aid in the work should not be neglected. We do not at present refer to colleges and schools, for these, whenever education is discussed, come prominently before the popular mind, but our remarks are directed rather to such places as museums, whose work in higher education of the kind required in modern days is of considerable importance . . . It has often struck us as rather a reflection on Cape Town that there is no Society here for the discussion of natural science subjects, and though we are aware of some obstacles to the successful working of such a body, we see no reason why they should not be overcome. In the capital of every Colony of which we have any knowledge, a Society of the kind exists, and indeed in the Cape itself there are towns that, in this respect at least, are ahead of the metropolis.

"But though we have no Natural Science Society in Cape Town, we have what, all things considered, may be said to be an excellent Museum. . . . The Museum was founded under the enlightened influence of the then Governor, Sir George Grey, in 1855, and in 1857 was incorporated by Act of Parliament. Its first trustees were Mr. Rawson, the Colonial Secretary at the time, Sir Thomas Maclear, the then Astronomer Royal, and Dr. Pappe, the then Colonial Botanist. On Dr. Pappe's death Mr. C. A. Fairbridge was appointed a trustee, and upon the resignation of Mr. Rawson, on his departure from the Colony, his place was filled by Mr. Southey, now Lieut.-Governor of Griqualand West. It will be thus seen that the Museum has from the first been under the management of trustees alike of scientific acquirements and business ability. In its first curator, Mr. Layard, it was extremely fortunate, and it had the advantage of his enthusiastic labours for the lengthy period of fifteen years.

"But though it has had the advantage of excellent management, the development of the institution has been seriously hindered from want of funds, and it has not received, either from the Legislature or the public, that pecuniary support necessary to secure the services of efficient officers and to meet the thousand and one expenses of cases, glass, chemicals, and the appliances and apparatus required in carrying out the work of a museum. It is a wise policy on the part of the Legislature to vote grants of money to such institutions in proportion to the pecuniary support received from the public, and if Parliament is to be induced to make a larger grant to the Museum, the private subscription list must be extended. The small sum of one guinea represents the subscription for a year, and we are quite sure, when it is known how much the institution stands in want of funds, the list of subscribers will become larger.

"Strangers who visit the Museum and who know how such things are managed elsewhere must smile when told that its curator is a clerk in the Civil Service, whose time is chiefly occupied in doing the work of a subordinate officer in the Colonial Office. We say this without any intention of disparaging the gentleman referred to, for his attainments in one branch of Science at least are universally admitted; but we do say that, if the South African Museum is to be anything like worthy of the name, and if it is to continue efficiently to perform the work so well commenced by Mr. Layard, its curator should devote the whole of his time and attention to the duties of that office. Under existing circumstances, that, however, is not to be expected, as the salary is not sufficient to induce any qualified gentleman to give up other positions for the sake of applying himself entirely to the work of the Museum.

"There are other matters connected with this institution to which we might draw attention, but until more public support is given to the Museum it would be a waste of time to refer to them."

GEOLOGICAL MAP OF AUSTRALIA AND TASMANIA *

GEOLOGICAL surveys have been proceeding, to a greater or lesser extent, in all the Australian colonies for several years, and in Victoria the work has been prosecuted so systematically, and with such success, that the main features of the surface geology of the country are comparatively well ascertained and mapped out. The example in this respect set by Victoria has been followed to a very considerable extent by Queensland, and in a lesser degree by several of the other colonies. A geological map of Australia has, however, never been issued. Such a work would be invaluable, and the materials obtained are quite sufficient to justify an attempt being made to carry it out. Such an attempt is now being made by the Mining Department of Victoria. Some months since the Hon. A. Mackay, Minister of Mines, put himself in communication with the Governments of the other colonies with the view of obtaining from them all the information in their possession respecting the geological characteristics of the territories over which they presided. The application was readily acceded to, and a large mass of materials has been since placed at the disposal of the Mining Department of Victoria. Under the direction of Mr. R. Brough Smyth, F.G.S., Secretary for Mines, this has been thoroughly digested and arranged, and is now being embodied in a map, which, when completed, as it will be shortly, will show at a glance the result of all geological surveys made in Australia and Tasmania up to the present time. As the value of such a work necessarily depends upon the accuracy of the observations upon which it is based, it may be well, before attempting a brief description of its main features, to indicate the source from whence the materials used in its compilation have been derived. The geological sketch map of Victoria, exhibited by the Mining Department at the late Intercolonial Exhibition, and which contains the results of the latest surveys made in the colony, will be embodied in the general map. It was compiled by Mr. Brough Smyth from surveys made some years ago under the direction of Mr. A. R. C. Selwyn, at present director-general for the Geological Survey of Canada, but who formerly held a similar position in this colony, and from surveys made since by the officers of the mining department. It has been described "as the nearest approximation that can at present be made to a true representation of the rock masses which are exposed in this colony." The New South Wales Government have in preparation a geological map, which, it is expected, will be available for use before the general map is published.

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* From an article in the *Melbourne Argus*, July 7.

The Queensland Government has been keenly alive to the importance of mapping out the immense mineral districts of that colony, and for some years has kept a staff of geological surveyors actively employed in the work. The information thus collected has been embodied in a series of elaborately-coloured and beautifully-executed maps, which have proved of great service in the compilation of the general map of Australia. An excellent sketch map, covering a considerable portion of the colony, has been obtained from the Government of South Australia. It was compiled under the direction of Mr. A. B. Cooper. It is especially valuable, as it embraces a great part of the populated districts. The country north of Encounter Bay, the most extensive mineral district in the southern portion, was examined and reported on by Mr. Selwyn many years ago, and a sketch map prepared by him is being used in compiling the new map. The same district has been very recently reported upon by Prof. Ulrich, at the request of the Government, and his observations are proving of great assistance.

Thanks to the energy of Mr. C. Gould, a son of the eminent naturalist, the geological characteristics of Tasmania were very accurately delineated during the time he was geologist for the colony. An excellent map was published under his direction, and he voluntarily made a number of additions to it a short time ago, when he learnt that a copy was to be transmitted to Victoria to be used in the preparation of the general geological map of Australia.

A large portion of the vast territory of Western Australia has been surveyed by Mr. H. Y. L. Brown, Government surveyor, but who was once attached to the geological staff of Victoria. This gentleman has produced a very beautiful sketch map of the S.W. portion of the colony, which has been extensively used by the compiler of the new map. It thus appears that every care has been taken to obtain the most accurate information at present available.

An examination of the map discloses facts of interest not only to geological students but to the public at large. The value of the map to men engaged in mining is too palpable to call for comment, as it shows at a glance the formations in which the precious metals occur. In rocks belonging to the primary or palæozoic group, gold, tin, antimony, silver, lead, and copper may be confidently searched for. The secondary or mesozoic rocks contain coal, while tin is frequently found associated with granitic rocks. Persons engaged in pastoral and agricultural pursuits will also derive advantage by consulting this map. A very little geological knowledge will tell them that in districts where the principal rock masses belong to the tertiary period they may look for well-grassed plains suitable for pasture. In areas where the volcanic rocks abound, rich soil, well adapted for agricultural pursuits, may be expected. The slatey ridges formed by the older silurian rocks, and the sparsely grassed mountains of granitic rock which abound in Western Australia, also convey a valuable lesson to the intelligent observer. One of the most prominent geological facts which the map discloses is, that a great metalliferous belt lies on each side of the main Cordillera from Cape Yorke to the southern point of Tasmania. It is composed chiefly of metamorphosed schists and granite rocks overlain in a considerable area by the newer palæozoic rocks and mesozoic coal-bearing strata. Another great belt appears to extend from Encounter Bay in South Australia towards the Gulf of Carpentaria. North of the 30th parallel of latitude the schists are overlain by tertiaries, and what Mr. Daintree considers to be rocks of the cretaceous age up to lat. 20° to 23°, where a large patch of metamorphic schist occurs. The whole tract west of the eastern metalliferous belt is occupied by tertiaries. Wide treeless plains, and what are called desert sandstones, abound. The vast tract of country known as Central Australia will have to be marked "unknown," as geological surveys have not yet been made of it. What is at present known of the geological character of the northern portion of South Australia will be mapped out. The Government of South Australia have furnished a very good map showing the palæozoic tract of Port Darwin, and from notes made by explorers the department has been able to lay down a large granitic tract also, as well as a large area covered with rocks of volcanic origin. The coal rocks are seen extending all along the coast from Port Curtis, in Queensland, in an almost unbroken line to Eden or Twofold Bay. They are especially prominent at Newcastle and Wollongong, in New South Wales. They again appear north of Corner Inlet, at Cape Otway, and can be traced in broken patches along the coast up to Glenelg, where they apparently terminate. Another interesting fact established by the new map is, that within the tertiary era connection has existed between Tasmania and the main land. There is a strict resemblance between the geology of Tasmania and the continent, and the chain of granite islands extending from Wilson's Promontory, the southernmost point of Australia, to Cape Portland, the northernmost point of Tasmania, have all their ridges capped with tertiaries, thus showing that within the tertiary period the island and the continent must have been connected. The main geological characteristic of Western Australia is the immense area occupied by granitic rocks, varied occasionally by patches of sandstone, especially on the southern coast line. A comparatively small part is occupied by a belt of metamorphic rocks to the east of Champion Bay. Volcanic rocks are also visible. A large granitic tract occurs in the basin of the Shaw River, east of Dampier's Archipelago. It appears that there has been a greater amount of denudation on the western side of the continent than on the eastern. Where the altitude is that of the Dividing Range, which varies from about 1,500 ft. to 7,000 ft., either granite, metamorphosed schists, or silurian rocks are found. Underneath the basalt or volcanic rocks in Queensland, as well as at Ballarat, the deep leads occur. It is curious to note that the deep leads of Queensland contain tin as well as gold. Wherever the dark red patch appears indicating granite, tin may be expected to be found. The extraordinary richness of the tin deposits of Queensland and New South Wales will probably cause the immense granitic tracts of Western Australia to be thoroughly explored. The middle belt of metamorphic schists which occurs in South Australia is as well known for its extensive copper mines as the eastern belt is for its gold.

The Mining department of Victoria has established a high reputation for the general excellence of the geological maps it has produced. The last effort will reflect equal credit upon the officers employed upon it. The rocks are shown in a descending order, and are easily recognised by the distinguishing colours with which they are tinted. A system of lettering the face of the map has also been adopted, which will facilitate the rapid identification of the rocks. In general appearance the map will more closely resemble those prepared in Germany or France than those compiled in England. As already mentioned, the responsible and onerous task of reducing the mass of materials obtained from so many different sources, and embodying the results of so many months of patient investigation, in the new map, has been performed by Mr. R. Brough Smyth. Mr. A. Everett, a draughtsman employed in the Mining department, has been entrusted with the duty of colouring the map, and Mr. R. Shepherd has performed the diffiult work of colouring it on stone.

NOTES

SIR SAMUEL and Lady Baker arrived at Cairo, last Sunday. All was well.

THE twenty-second session of the American Association for the Advancement of Science commenced its meetings at Portland, Maine, on Wednesday, 20th inst. Prof. Lovering, of Cambridge, is president for the year.

THE discovery is announced, from America, of another small planet, No. 133, by Prof. Watson, of the Ann Arbor Observatory.

THE session of the Iron and Steel Institute at Liége was brought to a close on Thursday, on which evening the King of the Belgians gave the members a grand reception at Brussels. There was an interesting discussion on Wednesday morning between Mr. Bulgenbach and Mr. Bell at the Institute, on the subject of the construction of high furnaces. Papers were read relative to various technical matters, and the President read a paper upon the extension of commercial relations with China. In the afternoon more than 450 excursionists paid a visit to the factory of Messrs. Cockerill at Seraing. Several speeches were made, and the visitors, who were most cordially received, remained four hours. It has been decided that the Congress should meet in 1874 in Philadelphia, and in 1875 in England. A very interesting paper was read at one of the meetings by M. Julien Deby, C.E., "On the Rise and Progress of the Iron and Steel Industries in Belgium," in which he said:—"We are very ignorant of the state of things in this country prior to the arrival of Julius Cæsar. Archæological discoveries of quite recent date, still unpublished, seem to indicate that at the period of the great Roman conqueror's invasion Iron had already been made in Belgium, while it was yet unknown to the inhabitants of the British Islands. The oldest records we have consist in vast deposits of cinder which cover many acres of ground, and are situated at Niew Rhode, between Louvain and Aerschot, in Brabant, as well as at Tessenderloo, in the Antwerp campagne, where they generally occupy the top of the many ferruginous hillocks of that region. Along with these accumulations of iron cinder are found flint arrow-heads and fragments of coarse pottery, characteristic of the earliest dawn of civilisation, and which must have belonged to the old pre-historic workers of these deposits. At a later period, and during the Roman dominion, iron was produced in very many places in Belgium. Immense heaps of cinder are to this day scattered in many parts of the country, and several of these are being profitably worked in the neighbouring blast furnaces."

THE meetings of the British Archæological Association at Sheffield were brought to a close on Saturday. The time has been spent by the members in visiting most of the places of archæological interest in the district during the day, and in listening to papers read in relation to the places visited, as well as on other subjects. On Wednesday night, at a *conversazione* in the Cutlers' Hall, Mr. R. N. Phillips read a paper on the "Manufacture of Hardware by Celts and Romans," illustrated by fine specimens in bronze of various degrees of advancement, a baked clay melting-pot, and a bronze ingot. He adduced evidence of mining and smelting by Romans, and stated their wood-smelted iron to be of unequalled malleability. He suggested that the Romans held Britain for the sake of its mineral wealth; their extensive beds of scoriæ in the Forest of Dean were still so rich in ironstone that they were being re-smelted. Mr. T. Morgan read a paper on the "Earliest Tribes of Yorkshire," and Mr. Alfred Wallis one on the "Pre-historic Remains on the Derbyshire Borders."

AT the meeting of the Somersetshire Archæological and Natural History Society held at Wells last week Dr. Beddoe gave a brief sketch of the ethnological history of the county, and showed its bearings upon the physical aspect of the population at the present day. We learn from the paper that the people of the eastern half of the county have, on the whole, broader heads, lighter hair, and darker eyes than those of the western half. In all these respects the eastern men approach more to the ordinary English, the western to the Irish, standard. The mixed blooded inhabitants of the towns appear to be lighter as to both eyes and hair than the people of either division. The fair and handsome Frisian type is pretty common in the north of the county. In the hilly south-eastern region about Wincanton dark complexions and dark or even black hair attest the late and imperfect Saxonisation of the country; the same may be said of the Quantocks. About Minehead and Dunster, perhaps from the less fixity of the population induced by seafaring, there is more evidence of mixture of blood; and in Exmoor and in some villages of Mendip the narrow skull, prominent jaws, and bony frame of the Gaelic type and the Turanian oblique eye and pyramidal skull crop up.

DR. BELL PETTIGREW, F.R.S., has been appointed Lecturer on Physiology at the School of Medicine, Surgeons' Hall, Edinburgh.

THE Secretaries of Section C (Geology) of the British Association request the attention of authors to the rule requiring the early transmission of papers. In order that the work of the Organising Committee may be completed in time, all papers and reports, accompanied by abstracts, should be forwarded to the General Secretaries not later than September 4.

WE are indebted to Mr. G. Gore, F.R.S., for a copy of a reprint of an able article of his on the "National Importance of Scientific Research," which appeared in a recent number of the *Westminster Review*. We are glad to have the opportunity of drawing attention to Mr. Gore's paper, as it forcibly expresses the view we have so persistently advocated in our own columns. Mr. Gore, after showing that the pursuit of pure Science is rarely rewarded in this country, points out that it is the duty of the State to provide and pay for pure scientific research, for the following reasons:—"Because the results of such labour are indispensable to national welfare and progress; because the results are of immense value to the nation, and especially to the Government; because nearly the whole pecuniary benefit of it goes to the nation, and scarcely any to the discoverer; because research cannot be efficiently provided for by means of voluntary effort; and because there appears to be scarcely any other way (except by application of University revenues) in which discoverers can be satisfactorily paid for their labour." At present, as the writer states, the men paid the highest are not those who discover knowledge, but those who use and apply it. The reason for this apathy of the public as regards scientific work is, as Mr. Gore shows, clearly traceable to a widespread and lamentable ignorance of the nature and value of scientific inquiry. To diffuse natural knowledge among all classes of society is therefore a great duty at the present time.